

Children's Environmental Health: Research Complimentary to the NCS

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Research Complementary to the National Children's Study

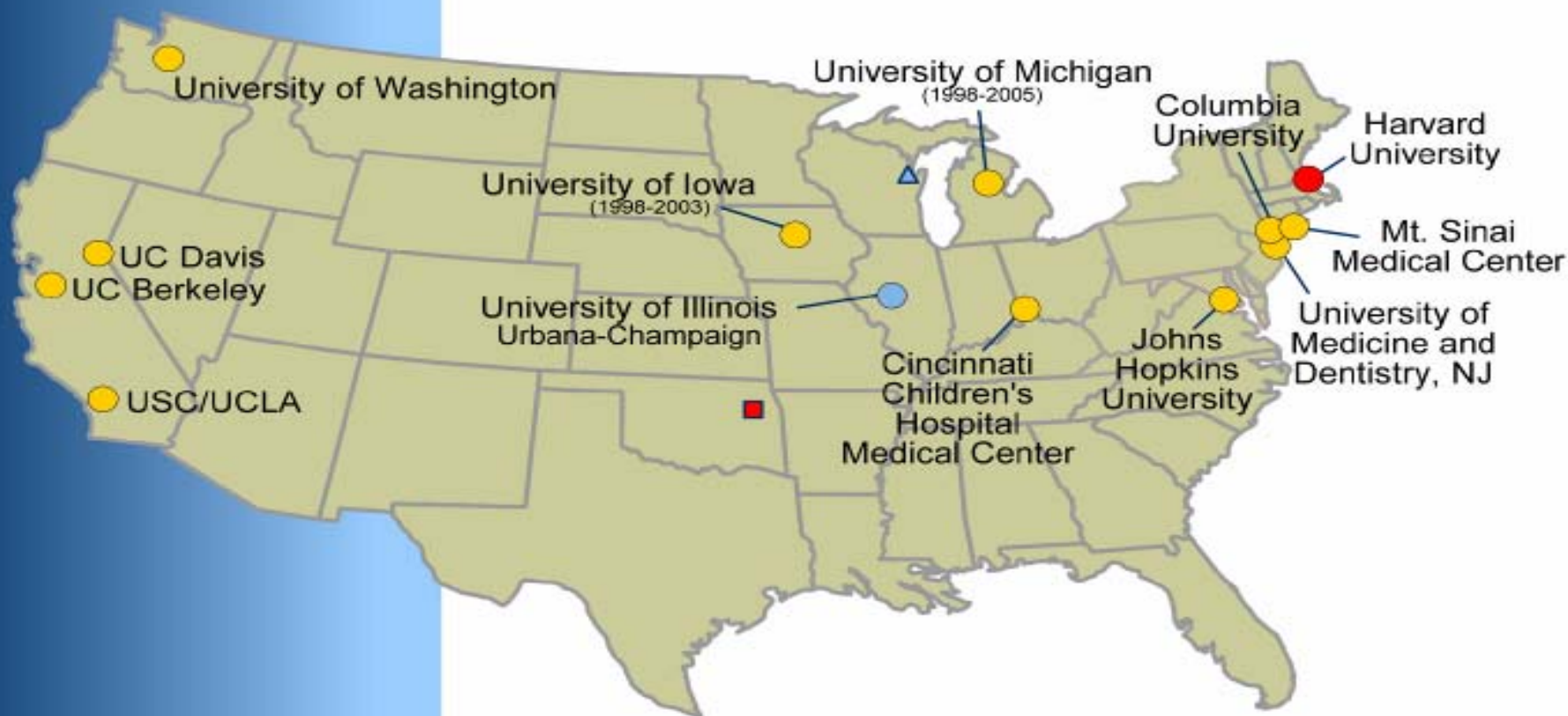
- Long term health effects of lead, mercury, and air pollution
- Community Based Participatory Research
- Environmental Justice
- Centers for Children's Environmental Health and Disease Prevention Program

**NIEHS/EPA Centers
for Children's
Environmental Health
and Disease
Prevention Research**

**Children's Environmental
Health Center Locations**

**Study Sites Separate from
Center Locations**

- Harvard Study Site: Tar Creek, Oklahoma
- ▲ Illinois Study Site: Green Bay, Wisconsin



Purpose of the NIEHS/EPA Centers for Children's Environmental Health and Disease Prevention Program

- **Laboratory + population health effects + exposure assessment research**
- **Development & test risk management strategies in order protect the health of children**
- **Promote multidisciplinary interactions among basic, clinical, & behavioral scientists & develop a future workforce**
- **Accelerate translation of basic research findings into clinical or intervention strategies to reduce exposures and health outcomes in young children**
- **Establishment of a national network of children's environmental health researchers**

Questions being addressed in Children's Centers

- **Respiratory Disease**
- **Does air pollution cause new cases of asthma, exacerbate existing disease, and affect lung growth and function?**
- **How do genetic polymorphisms play a role in response to air pollution and susceptibility to asthma?**
- **Can we reduce allergens exposures in homes to prevent recurrent episodes of asthma?**

Questions being addressed in Children's Centers

- **Growth and Development**
- **How does exposure to pesticides, metals and other endocrine disrupting chemicals affect growth, development, learning and behavior, in utero, in young children, and through adolescence?**
- **Are there susceptible sub-populations? Are the affects the same in urban and rural populations?**
- **How does the social environment modify these risks?**
- **Can we use interventions such as integrated pest management, & breaking the take home pathway to reduce exposures to children?**

Questions being addresses in the Children's Centers

- **Autism**

- **What are the environmental and genetic risk factors for developing autism?**
- **How do they affect the various phenotypes of autism?**
- **How do chemicals/exposures in the environment affect the critical cells of the brain that are central to the development of autism?**
- **Using animal models that show characteristics of autism spectrum diseases, what can we learn about the impact of chemicals on behavior, language and learning?**

Lessons learned from the NIEHS/EPA Children's Environmental Health Centers (EHP, October 2005)



- **TIME** – to assess the full range of developmental consequences to environmental chemicals and other exposures
- **OUTCOME ASSESSMENT** – in broad and narrow in scope
- **EXPOSURE ASSESSMENT**- environmental and personal measures working in concert with observational and ecologic approaches
- **QA/QC**
- **COMMUNITY PARTICIPATION** is paramount to success
- **ETHICS**

Focus on exposure assessment in the Children's Centers

- **Environmental assessment**
 - Home, School, Car, Neighborhood
- **Geographic Information System**
- **Questionnaire assessment**
- **Biomonitoring**
 - Biospecimens collected from mother and child

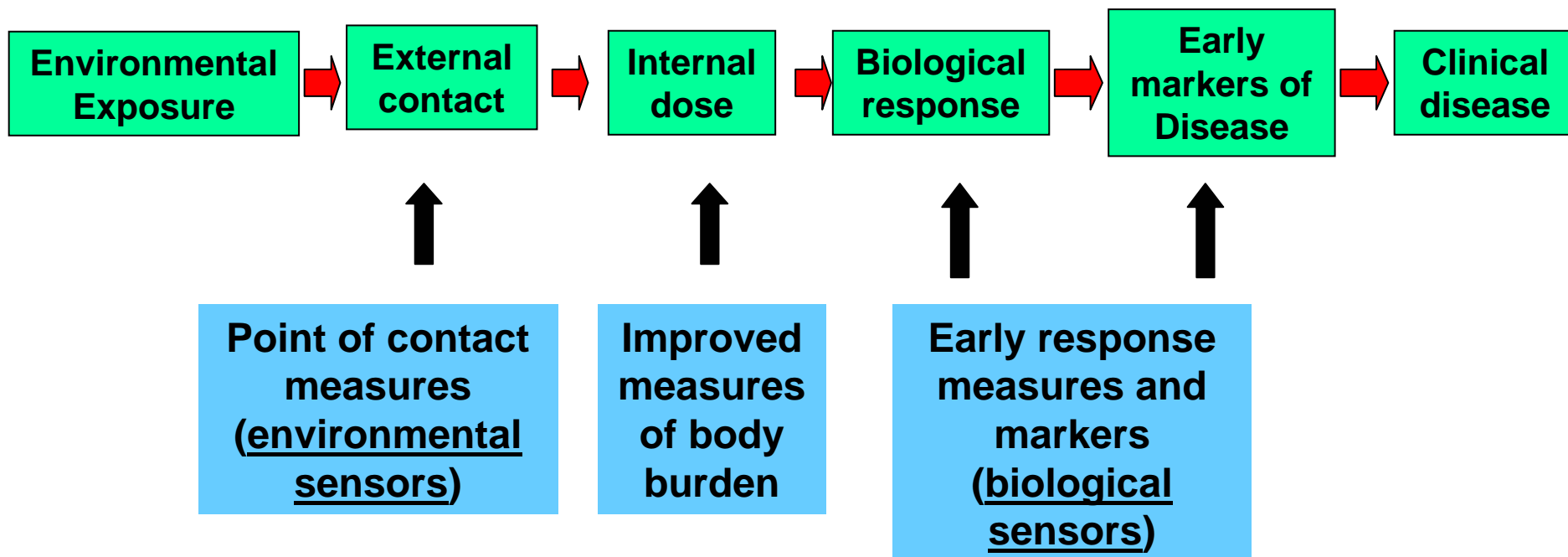
Biomarker research within the Children's Centers

- **Maternal assessments-
Personal air sampling,
biomonitoring**
- **Assessment of children's
body burden through
measurements in
biospecimens collected at
critical windows of
exposure and development**
- **New methods developed –
meconium, phthalates,
urinary metabolites of
organophosphate
pesticides**
- **Mother – child comparisons**
 - Cord blood, other samples
- **Integrated biomarkers**
 - PAH- DNA adducts
- **Comparison across a suite
of biomarkers; across time;
across geography**

Possible strategies for improvements in exposure assessment

- **Improve integration with biologic response**
- **Improved personal monitoring using real time monitoring**
- **Use of new technologies that define response on the cellular and molecular level**
 - **Genomic signatures**
 - **ID of proteomic responses**
 - **Metabolomic patterns of exposure by-products**
- **Better defined time course of exposure response**
- **Increased statistical precision**

More Precise Markers of Exposure



Links personal exposures to body burden to biological response

NIEHS new initiative – Exposure Biology

- **New technology to develop biomarkers of cellular response to environmental exposures**
 - toxicogenomics, proteomics, metabolomics
- **Are there exposure specific signatures?**
 - **Aging, acute vs. chronic exposure scenarios, dose, route of exposure**
 - **Are they tissue specific? Can they be measured in peripheral blood or other available biospecimens?**
 - **Are they affected by disease pathology?**

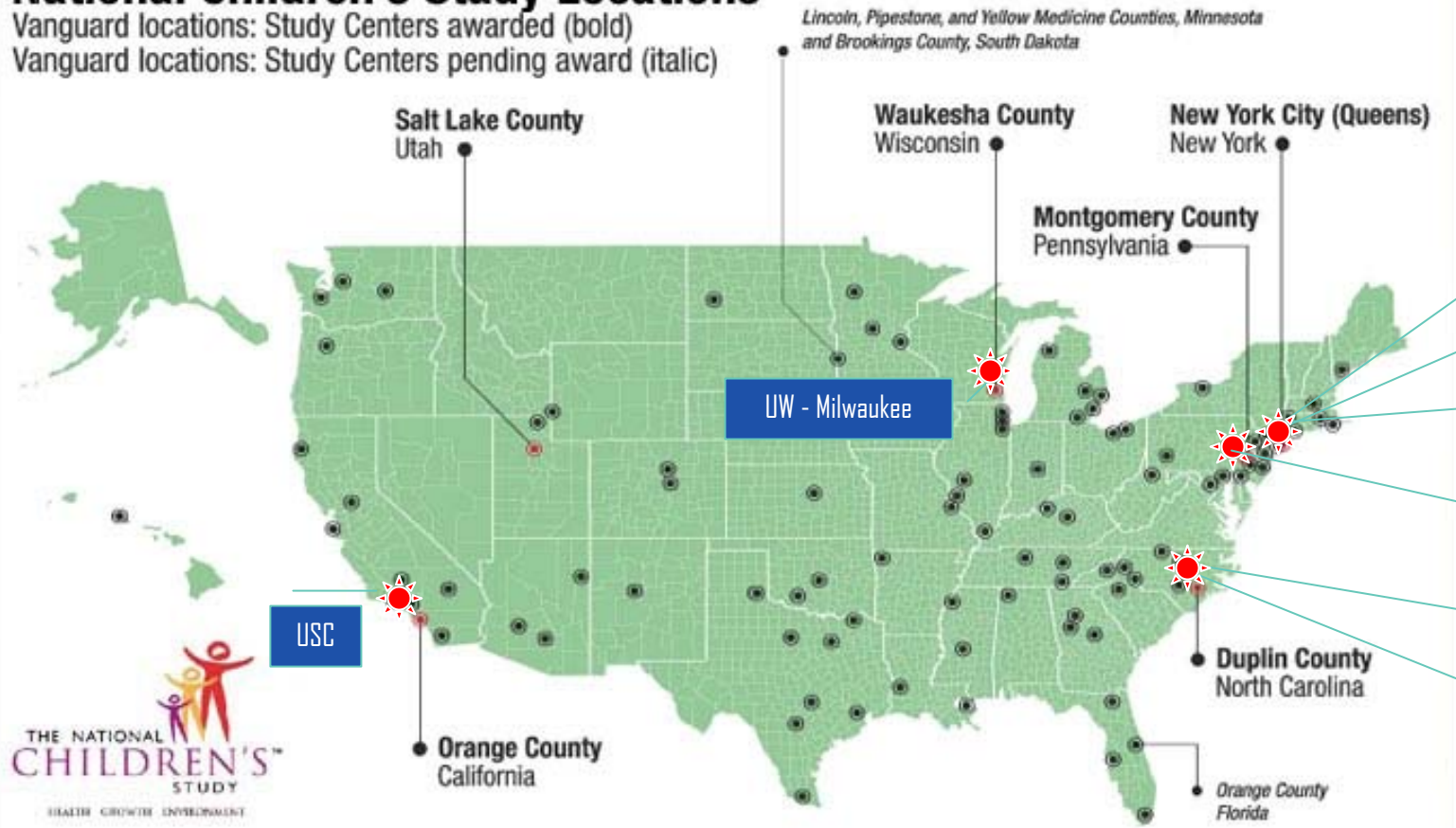
Exposure Biology Initiative

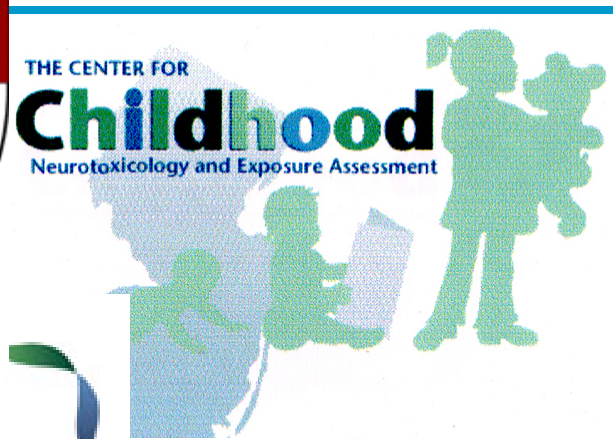
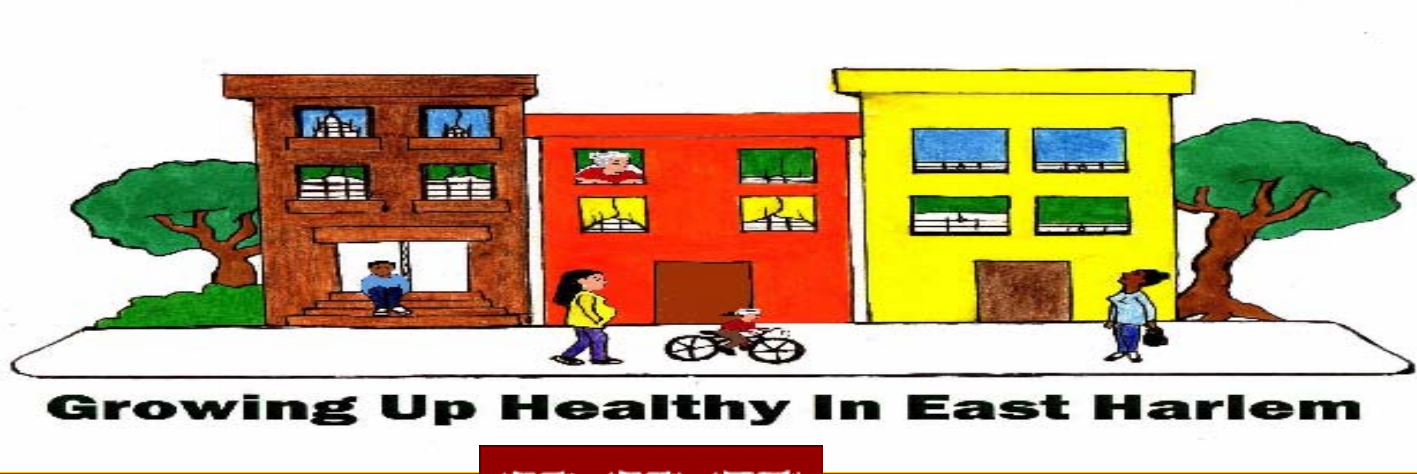
- **Develop the biomarkers in animals and humans to compare and contrast response**
- **Focus on well characterized populations with stored biospecimens to develop and validate exposure -response markers**
 - **Compare with questionnaire assessment, body burden measures, and other currently used biomarkers**

National Children's Study Locations

Vanguard locations: Study Centers awarded (bold)

Vanguard locations: Study Centers pending award (italic)





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